CLAIMS

WHAT IS CLAIMED IS:

1. A propellant composition made from a lacquer, said lacquer comprising:

(a) from about 15 to about 70 wt% of an organic solvent;

(b) from about 0.1 to about 2.5 wt% of a stabilizer;

(c) optionally, from about 0% to about 40 wt% of an energetic plasticizer;

(d) optionally, from about 0 to about 10 wt% of a nonenergetic plasticizer;

(e) optionally, from about 0 to about 10 wt% water;

(f) optionally, from about 0 to about 15 wt% of additional additives; and

balance being nitrocellulose; all weight percents based on the total weight of said composition, and wherein said lacquer has a viscosity of less than 10 million centipoise when processed.

2. The propellant composition of claim 1, wherein said organic solvent is selected from the group consisting of ethyl acetate, ether, acetone, and combinations thereof.

3. The propellant composition of claim 1, wherein said stabilizer is selected from the group consisting of diphenylamine, ethyl centralite, diethyldiphenylurea, 2-nitrodiphenylamine, N-nitrosodiphenylamine, and combinations thereof.

4. The propellant composition of claim 1, wherein said optional energetic plasticizer is selected from the group consisting of nitroglycerin, ethylene glycol esters, methylene glycols, glycol esters, bis(2,2-dinitropropyl)formal acetal ,and combinations thereof.

5. The propellant composition of claim 1, wherein said optional nonenergetic plasticizer is selected from the group consisting of dibutylphthlate, adipate esters, and combinations thereof.

6. The propellant composition of claim 1, wherein said optional additional additives are selected from the group consisting of lubricants; coolants; barrel wear additives; flash suppressants; decoppering agents; energetic solids, and combinations thereof.

7. A propellant composition made from a lacquer, said lacquer consisting essentially of:

(a) from about 30 to about 65 wt% of an organic solvent selected from the group consisting of ethyl acetate, ether, acetone, and combinations thereof;

(b) from about 0.25 to about 1.5 wt% of a stabilizer selected from the group consisting of diphenylamine, ethyl centralite, diethyldiphenylurea, 2-nitrodiphenylamine, N-nitrosodiphenylamine, and combinations thereof;

(c) optionally, from about 5% to about 25 wt% of nitroglycerin as an energetic plasticizer;

(d) optionally, from about 0 to about 3 wt% of a nonenergetic plasticizer selected from the group consisting of dibutylphthlate, adipate esters, and combinations thereof;

(e) optionally, from about from about 0 to about 4 wt% water;

(f) optionally, from about 0 to about 15 wt% of additional additives selected from the group consisting of lubricants; coolants; barrel wear additives; flash suppressants; decoppering agents; energetic solids, and combinations thereof; and

balance being nitrocellulose;

wherein all weight percents are based on the total weight of said composition, and wherein said lacquer has a viscosity of between 1 million and 3 million centipoise.

8. A method for manufacturing perforated propellant grains, comprising the steps of:

extruding a propellant lacquer through an extrusion die assembly to form one or more propellant lacquer strands, said extrusion die assembly having a plurality of holes, each of said holes having at least one pin tip positioned therein, said propellant lacquer comprising:

(a) from about 15 to about 70 wt% of an organic solvent;

(b) from about 0.1 to about 2.5 wt% of a stabilizer;

(c) optionally, from about 0% to about 40 wt% of an energetic plasticizer;

(d) optionally, from about 0 to about 10 wt% of a nonenergetic plasticizer;

(e) optionally, from about 0 to about 10 wt% water;

(f) optionally, from about 0 to about 15 wt% of additional additives; and

balance being nitrocellulose; all weight percents based on the total weight of said composition, and wherein said lacquer has an extrusion viscosity of less than 10 million centipoise;

cutting said propellant lacquer strand to a desired dimension to form perforated propellant grains;

suspending said perforated propellant grains in a water based liquor;

removing said organic solvent and water from said perforated propellant grains; and

hardening said perforated propellant grains.

9. The method of claim 8, wherein said perforated propellant grains have a circular cross-section.

10. The method of claim 8, further comprising the step of compressing said perforated propellant grains to form perforated propellant grains having an ellipsoidal cross section.

11. The method of claim 8, wherein said plurality of holes and said pin tips of said extrusion die assembly are arranged to form perforated propellant grains having outwardly extending ridges.

12. The method of claim 8, wherein said organic solvent is selected from the group consisting of ethyl acetate, ether, acetone, and combinations thereof.

13. The method of claim 8, wherein said stabilizer is selected from the group consisting of diphenylamine, ethyl centralite, diethyldiphenylurea, 2-nitrodiphenylamine, N-nitrosodiphenylamine, and combinations thereof.

14. The method of claim 8, wherein said optional energetic plasticizer is selected from the group consisting of nitroglycerin, ethylene glycol esters, methylene glycols, glycol esters, bis(2,2-dinitropropyl)formal acetal, and combinations thereof.

15. The method of claim 8, wherein said optional nonenergetic plasticizer is selected from the group consisting of dibutylphthlate, adipate esters, and combinations thereof.

16. The method of claim 8,, wherein said optional additional additives are selected from the group consisting of lubricants; coolants; barrel wear additives; flash suppressants; decoppering agents; energetic solids, and combinations thereof.

17. A perforated propellant grain having outwardly extending ridges.

18. A perforated propellant grain having an ellipsoidal cross section.